REMARKS

This amendment is responsive to the Office Action mailed March 8, 2007. Reconsideration and allowance of claims 1-16, 18-28, and 30 are requested.

The Status of the Claims

Claims 1-30 were examined in the Office Action mailed March 8, 2007.

Claims 1-3, 6, 8, 13, 14, 17, 18, 24, 26, and 27 stand rejected under 35 U.S.C. § 102(b) as being allegedly anticipated by Gagnon et al., EP1008865A2 (hereinafter, "Gagnon_EP").

Claims 17 and 23 stand rejected under 35 U.S.C. § 102(b) as being allegedly anticipated by Ashburn, U.S. Pat. No. 6,147,352 (hereinafter, "Ashburn").

Claim 17 stands rejected under 35 U.S.C. § 102(b) as being allegedly anticipated by Perusek et al., U.S. Pat. No. 4,651,007 (hereinafter, "Perusek").

Claims 4, 5, 20, and 28-30 stand rejected under 35 U.S.C. § 103(a) as being allegedly unpatentable over Gagnon_EP.

Claims 11, 12, 15, and 23 stand rejected under 35 U.S.C. § 103(a) as being allegedly unpatentable over Gagnon_EP in view of Marks, U.S. Pat. No. 5,391,877 (hereinafter "Marks").

Claim 9 stands rejected under 35 U.S.C. § 103(a) as being allegedly unpatentable over Gagnon_EP in view of Engdahl, U.S. Pat. No. 6,303,935 (hereinafter "Engdahl").

Claims 10 and 25 stand rejected under 35 U.S.C. § 103(a) as being allegedly unpatentable over Gagnon_EP in view of Gagnon, U.S. Pat. No. 6,177,675 (hereinafter "Gagnon_675").

Claim 16 stands rejected under 35 U.S.C. § 103(a) as being allegedly unpatentable over Gagnon_EP in view of Balan, Int'l Publ. WO 00/75691 A1 (hereinafter "Balan").

Claims 7, 19, 21, and 22 stand rejected under 35 U.S.C. § 103(a) as being allegedly unpatentable over Gagnon_EP in view of Ishihara, U.S. Pat. No. 5,055,687 (hereinafter "Ishihara").

Claims 18-20 stand rejected under 35 U.S.C. § 101 as being drawn to subject matter that is allegedly not patent eligible.

Claim 29 stands rejected under 35 U.S.C. § 112, 2nd paragraph for certain alleged indefiniteness.

Claims 4, 12, and 13 are objected to for certain informalities.

The Objection to the Specification is addressed

As the Office Action correctly notes, the original specification erroneously referred to the parameter W_z as detector width at page 8 line 30. The amendment to the specification replaces this with "slat height" in conformance with usage of the parameter W_z elsewhere in the original specification and in conformance with what is shown in FIGURE 2.

As this amendment corrects an obvious error, it is respectfully submitted that the amendment to the specification should be entered. As this amendment obviates the objection to the specification, Applicants ask that the objection to the specification be withdrawn.

The claim objections are addressed

In claim 4, the objected term "width of each generally linear detector" is replaced by "width of the radiation sensitive surface parallel to the slats". The radiation-sensitive surface has antecedent basis in claim 1. The width of this surface parallel to the slats corresponds to parameter C_y in FIGURE 2, and the amendment finds support in the original specification at least at page 7 lines 21-26 and page 8 lines 15-24.

The objection to claim 12 is remedied by amending parent claim 11 to specify the generally toroidal housing set forth forth in claim 11 is the "first" generally toroidal housing.

Claim 13 has been amended to remove the objected term.

The rejections under § 101 are traversed

Claims 18-20 stand rejected as allegedly being directed to subject matter that is not patent-eligible.

The Office Action acknowledges (page 3) that these claims appear useful and concrete, but objects that they provide neither a tangible result nor a physical transformation.

Applicants point out that these claims incorporate the limitations of parent claim 17, which calls for, *inter alia*, detecting radiation from the imaging volume at a generally planar radiation sensitive region of the radiation detector. Such detection necessarily produces a physical transformation, since quantum mechanical theory states that observation (i.e., detection) of a particle necessarily alters the quantum state of the observed particle. Thus, claims 18-20 incorporate transformation from one physical state to another, and accordingly it is respectfully submitted that the § 101 rejections should be withdrawn.

If the rejections under § 101 are maintained in the forthcoming Office Action, Applicants note Office guidelines in this matter, which state:

> If the invention as set forth in the written description is statutory, but the claims define subject matter that is not, the deficiency can be corrected by appropriate amendment of the claims. In such a case, USPTO personnel should reject the claims drawn to non-statutory subject matter under 35 U.S.C. § 101, but identify the features of the invention that would render the claimed subject matter statutory if recited in the claim.

http://www.uspto.gov/web/offices/pac/dapp/opla/preognotice/guidelines101_20051026.pdf at page 16.

Applicants respectfully request, if the § 101 rejections are maintained, that the forthcoming Office Action identify any features of the invention that are believed would render the claimed subject matter statutory if recited in the claims.

The rejection under § 112 is addressed

Claim 29 is canceled, thus obviating this rejection.

The Claims Distinguish Patentably Over the References of Record

Claim 1 has been amended to clarify that the radiation detector is arranged on the gantry at a constant fixed radial distance. Claim 1 calls for a nuclear

camera capable of performing SPECT imaging and including a rotatable gantry defining a gantry rotation axis and an imaging isocenter, and a gamma detector arranged on the rotating gantry at a constant fixed radial distance from the imaging isocenter to circularly and non-conformally orbit the imaging isocenter at the constant fixed radial distance, the gamma detector including a radiation sensitive surface and a collimator that collimates incoming radiation.

Claim 1 stands rejected as anticipated by Gagnon_EP. The Office Action notes that Gagnon_EP states that the detectors need not be moved radially with respect to the patient, thereby suggesting a fixed radial distance.

Gagnon_EP affirmatively teaches that the detectors can move "radially toward and away from the imaging region" that is, conformally orbit, the subject during imaging. As is known in the art, and described at least at pages 1-2 of the present application, such conformal orbiting is preferred for tomographic SPECT imaging ("SPECT" refers to "computed tomography" and hence "tomographic SPECT" is actually redundant). The cited paragraphs [0039]-[0040] of Gagnon_EP recognize that the apparatus described therein is a general-purpose nuclear camera that can be used for tomographic imaging (i.e., SPECT) or other techniques, such as fixed planar image acquisition in which the detector does not move at all, or whole-body planar scans in which the gantry is not rotated but the detectors are moved linearly along the patient. In some such applications, it may be advantageous to not move the detectors radially, such as when a fixed-detector image is acquired. This does not imply, however, that Gagnon_EP's gamma detectors are arranged on the rotating gantry at a constant fixed radial distance from the imaging isocenter.

Indeed, to provide a gamma camera capable of the diverse applications described in Gagnon_EP, the gamma detectors must be capable of gantry rotation and radial movement of the gamma detectors toward or away from the patient. This is true even though, as pointed out in Gagnon_EP ¶¶[0039]-[0040] ,these rotational or radial motion capabilities may not be used in some imaging techniques.

Claim 1 calls for a nuclear camera in which the gamma detector arranged on the rotating gantry at a constant fixed radial distance from the imaging isocenter. Gagnon_EP does not disclose or fairly suggest such a nuclear camera. Indeed, to the contrary Gagnon_EP teaches away from such a nuclear camera, by to the contrary

disclosing a nuclear camera that includes the capability to move the gamma detectors radially toward and away from the patient. In contrast, the nuclear camera called out in claim 1 does not have this capability.

Applicants particularly note that claim 1 is drawn to a nuclear camera, and not to a method of using such a nuclear camera. The limitation of claim 1 calling for the gamma detector to be arranged on the rotating gantry at a constant fixed radial distance from the imaging isocenter is an apparatus limitation, not a mode-of-operation limitation. There is no doubt that the gamma camera of Gagnon_EP *could* be used in a mode of operation in which the gamma detectors are held at a constant fixed radial distance. However, this possibility does not disclose or fairly suggest a *nuclear camera* in which the gamma detector is arranged on the rotating gantry at a constant fixed radial distance from the imaging isocenter.

Moreover, the skilled artisan reading Gagnon_EP would find no motivation to construct a nuclear camera such as that of claim 1. To the contrary, the skilled artisan reading Gagnon_EP would be strongly motivated to arrange the gamma detector on a robotic mechanism to enable it to be moved toward or away from the isocenter, so as to implement conformal SPECT trajectories as recommended in Gagnon_EP and commonly done in the art to maximize SNR.

Claim 11 calls for a nuclear camera including a rotatable gantry defining a gantry rotation axis and an imaging isocenter; a gamma detector arranged on the rotating gantry at a constant fixed radial distance from the imaging isocenter, the gamma detector including a radiation-sensitive surface and a collimator that collimates incoming radiation; a second radiation detector arranged on the rotating gantry at a constant fixed radial distance from the imaging isocenter, the second radiation detector being configured for at least one of a different resolution and a different imaging modality; and a first generally toroidal housing substantially enclosing the rotatable gantry, the gamma detector, and the second radiation detector.

Claim 11 calls out a combination in which the gamma detector is arranged on the rotating gantry at a fixed radial distance from the imaging isocenter. Because it does not have an adjustable radius, the (first) generally toroidal housing can substantially enclose the rotatable gantry and the gamma detector. In contrast, such enclosure would be problematic at best for the nuclear camera of Gagnon_EP since

the toroidal housing would prevent, or at least substantially limit, the radial adjustment range of the gamma camera.

Moreover, claim 11 calls for a second radiation detector arranged on the rotating gantry at a constant fixed radial distance from the imaging isocenter, the second radiation detector being configured for at least one of a different resolution and a different imaging modality. As discussed in the specification, the fixed radial distance of the gamma detector that enables such a second radiation detector to be included on the same gantry as the gamma detector. The present application also explains how the user can generate a second radiation detector as a gamma camera of different resolution, for example by changing the slat height or spacing.

Claim 13 calls for a nuclear camera including at least four SPECT radiation detectors rotatably arranged around an imaging region to receive emission radiation, the radiation detectors each disposed an equal constant fixed distance from an imaging isocenter, the radiation detectors each including a radiation sensitive surface that responds to the first emission radiation, a slat collimator disposed on each radiation detector between the radiation detector and the imaging region to provide planar collimation of incoming first emission radiation, and a means for spinning the collimator and radiation sensitive surface of each SPECT radiation detector about a detector axis.

Gagnon_EP does not disclose or fairly suggest such a nuclear camera in which the radiation detectors are each disposed at an equal constant fixed distance from an imaging isocenter. The Office Action proposes that this limitation is suggested by the teaching of Gagnon_EP that the detectors need not be moved radially with respect to the patient. Again, Applicants respectfully submit that this conflates a mode of operation with a structural limitation. Claim 13 relates to a nuclear camera, and not to a mode of operation of a nuclear camera. Nothing in Gagnon_EP discloses or fairly suggests a nuclear camera including the structural limitation of at least four SPECT radiation detectors rotatably arranged around an imaging region to receive emission radiation, the radiation detectors each being disposed an equal constant fixed distance from an imaging isocenter. Rather, Gagnon_EP discloses gamma detectors arranged at an adjustable (not fixed) radial distance from an imaging isocenter.

Claim 18 has been placed into independent form including the limitations of canceled base claim 17.

Claim 18 stands rejected as allegedly anticipated by Gagnon_EP. In making this rejection, the Office Action states (page 6, relating to incorporated base claim 17) that Gagnon_EP discloses that the detector is rotated in a generally circular manner and that the detectors need not be moved radially with respect to the patient, thereby suggesting a fixed radial distance arrangement for the detectors on the rotating gantry, and further notes that even detectors that can be moved radially are still capable of being set at a fixed radial distance.

If the above rationale is wholly correct (a point which Applicants do not concede, see below) then the anticipation rejection is improper. A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior reference. MPEP § 2131. Inherency may not be established by probabilities or possibilities. The mere fact that a certain thing may result from a given set of circumstances is not sufficient. MPEP § 2112. Accordingly, even if Gagnon_EP suggests a fixed radial distance arrangement for the detectors on the rotating gantry (a point which Applicants do not concede, see below), this is not sufficient to support an anticipation rejection under 35 U.S.C. § 102.

Moreover, Applicants do not concede that Gagnon_EP discloses simultaneously rotation in a generally circular manner and detectors not being moved radially with respect to the patient. The cited paragraphs [0039]-[0040] relate broadly to numerous modes of operation of the disclosed nuclear camera. In some of these modes, the gantry may be rotated; in others, it may not. In some of these modes, the detector heads may be moved toward and away from the patient, in others it may not. Because the nuclear camera of Gagnon_EP includes both gantry rotation and radial gamma detector movement capabilities, it is possible to operate in a mode in which the detector heads are held at a constant radius while the gantry (and hence the gamma detectors) are rotated. However, Applicants do not find in Gagnon_EP any disclosure or fair suggestion of advocating such an operational mode in which the gantry is rotated to perform SPECT imaging and the gamma detectors are simultaneously held at a fixed radial position. Rather, the skilled artisan reading Gagnon_EP would recognize a nuclear camera configured to perform SPECT imaging

using conventional conformal orbiting of the gamma detectors, and would be motivated to operate the nuclear camera, when performing SPECT imaging, in precisely that way including conformal orbiting.

Claim 26 calls for an imaging apparatus comprising a rotatable gantry defining a gantry rotation axis and an imaging isocenter, three or more gamma detectors arranged on the rotatable gantry at a fixed radial distance from the imaging isocenter, a collimator located on each of said three or more gamma detectors; and a means for processing data detected by said three or more gamma detectors to produce an image. This claim is rejected as anticipated by Gagnon_EP, based again on the allegation that Gagnon suggests a fixed radial distance arrangement for the detectors on the rotating gantry.

As noted previously, such a suggestion, even if present (which Applicants do not concede) would not suffice as a basis for rejection under 35 U.S.C. § 102. Moreover, the rejection ignores the plain text of Gagnon_EP, which expressly states that "[t]he detectors are mounted to the gantry 30 so as to be rotatable about an axis of rotation 70, radially toward and away from the imaging region, and tangentially with respect to the imaging region." Gagnon_EP ¶[0039] (underscore added). This express disclosure of a radially adjustable arrangement of the gamma detectors teaches away from any purported suggestion of a radially fixed arrangement. The fact that Gagnon_EP suggests one might choose to operate the nuclear camera without moving the gamma detectors in the radial direction does not change the fact that they are radially adjustably mounted – it merely means the operator can choose not to make use of this radial adjustment capability.

Claim 28 has been amended to call for the at least four SPECT radiation detectors to be each disposed at an equal fixed and non-adjustable distance from an imaging isocenter. Gagnon_EP discloses precisely to the contrary, namely that the SPECT radiation detectors be disposed at a radially adjustable distance from the imaging isocenter.

For at least the foregoing reasons, it is respectfully submitted that claims 1-16, 18-28, and 30 patentably distinguish over the references. Applicants therefore ask for allowance of claims 1-16, 18-28, and 30.

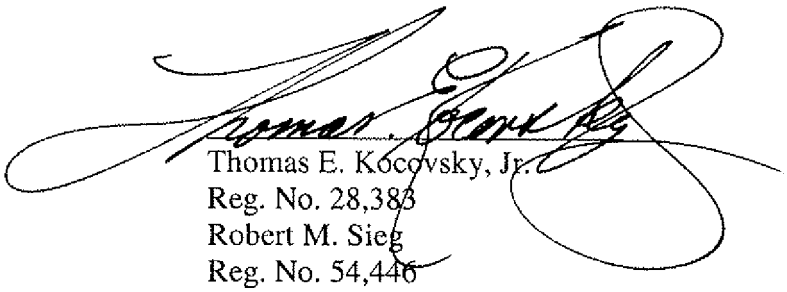
CONCLUSION

For the reasons set forth above, it is submitted that claims 1-16, 18-28, and 30 distinguish patentably over the references of record and meet all statutory requirements. An early allowance of all claims is requested.

In the event that personal contact is deemed advantageous to the disposition of this case, the Examiner is requested to telephone the undersigned at (216) 861-5582.

Respectfully submitted,

FAY SHARPE LLP



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